

REVIEW

Flora of New Zealand. By H. H. ALLAN. Vol. I. Indigenous Tracheophyta: Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledones. Government Printer, Wellington. liv + 1085. (April) 1961. \$14.70.

Although it was never published, the first flora of New Zealand was compiled nearly two centuries ago by Daniel Solander, a student of Linnaeus. Following it were works by notable botanists such as Allan Cunningham, Joseph Hooker, Thomas Kirk, and T. F. Cheeseman. This first volume of the newest "Flora of New Zealand" by H. H. Allan follows in the best tradition of New Zealand botany and is a distinguished contribution to the world's botanical literature.

The part issued includes all vascular plants indigenous to New Zealand except monocotyledons, presumably to be the subject of a later volume. Solander's manuscript described 360 species of vascular plants; Allan deals with 1457 species and 280 varieties of native vascular cryptogams, gymnosperms, and dicotyledons. If a rough estimate of the number of monocotyledons were added, the total number of native taxa would considerably exceed 2000. Allan originally conceived a revision of the second edition of Cheeseman's "Manual of the New Zealand Flora" (1925) which was out-of-date and had long been unobtainable, but it became clear that a complete reworking of the flora was necessary. Unfortunately, Allan did not live to see the publication of the work to which he had devoted so much of his time and energy. It was completed and guided through the press under the able and sympathetic direction of Lucy B. Moore. Most of the Flora was prepared by Allan, but several groups were treated by Miss Moore, including difficult genera such as *Myosotis* and all of *Hebe* except the whipcord hebes, and others were handled by M. B. Ashwin, who contributed sections on *Euphrasia*, the whipcord hebes, *Parahebe*, and *Pygmea*.

The preface to the work is followed by several pages of useful annals devoted to bibliographic citations and short notes on botanical literature relevant to New Zealand covering the period from Solander's manuscript of 1769 to papers published in 1958. A short section discusses the New Zealand Botanical Region, taken to include the Kermadec Islands, Three Kings Islands, Chatham Islands, the subantarctic islands (Antipodes, Aucklands, Campbell, Macquarie, and the Snares), and the three main islands of New Zealand. Next are pages explaining abbreviations used in the text, a list of authors of New Zealand taxa, and a synopsis of the classes and orders of the plant groups covered by the Flora. The arrangement of ferns follows a system by Holttum and that of the dicotyledons follows the first edition of Hutchinson's "The Families of Flowering Plants." The artificial keys to the families of dicotyledons and to the genera are praiseworthy for their simplicity; they seldom use more than single pairs of characters for making a choice. If satisfaction fails here, there are additional generic keys following each family listing in the main portion of the book.

New taxa are circumscribed in English in the text with their Latin diagnoses appended in a special section. Also included are a glossary covering technical terminology used in the descriptions and a series of drawings illustrating terms describing leaf morphology. The alphabetical list of Maori plant names will be of special use to visitors, since even professional botanists in New Zealand often refer to plants by names such as *kowhai*, *ti*, *rimu*, *manuka*, *puriri*, and *pohutukawa*. Some of these names have inspired genera such as *Hoheria* from *houhere*, *Tupeia* from *tapia*, *Corokia* from *korokio*, and additional specific names such as *totara*, *maire*, and *taraire*. A lengthy but useful group of supplementary notes precedes the index, the final section of the book. These notes make some typographical or factual corrections, additional comments, and amendments of parts of the text based on recent collections or newly-published monographs. They bring the work up to date through 1960 and correct virtually all errors in the text.

The original and critical nature of the Flora is reflected by the fact that three new genera, 29 new species, and 61 new varieties are described in it. The new genera

are: *Kirkophytum*, which includes two species formerly referred to *Stilbocarpa* (Araliaceae); *Neopanax*, to accommodate species formerly found in *Nothopanax* (Araliaceae); and *Kirkianella* as a monotypic genus for what has unhappily been called *Crepis novae-zelandiae*, a composite of uncertain affinities. Other genera have been dropped from the New Zealand flora, including *Leucopogon*, which Allan relegated to *Cyathodes*.

In this volume, 290 genera are recognized. Northern hemisphere botanists may be surprised to find familiar genera such as *Myosotis* (34 spp.), *Ranunculus* (43 spp.) and *Epilobium* (50 spp.) so amply represented. The largest genus is *Hebe*, with 79 species recognized—this even after the removal from it of peripheral entities such as *Pygmaea* and *Parahebe*. Next in size are *Celmisia* (58 spp.), *Epilobium* (50 spp.), and *Coprosma* (45 spp.). Nearly two-thirds of the three dozen endemic genera are monotypic. The vascular flora as a whole is about 80 per cent endemic according to an estimate made some years ago by Cockayne. Each island in the botanical province has its own endemic flora, and a number of these species have extremely limited ranges, being known only from a few or single colonies. Of particular phyto-geographical interest are the Three Kings Islands, only 8 square kilometers in area, which support about a dozen endemic species and two endemic genera. One of these genera, *Plectomirtha* (the only representative of the Anacardiaceae in New Zealand), is known only as a single tree! At least two species, *Tecomanthe speciosa* (the only member of the Bignoniaceae in New Zealand) and *Alectryon grandis* (Sapindaceae) occur only as single individuals on these islands!

Introduced plants were not recorded in this volume, but in view of their large number (576 species reported by Cheeseman in 1925) their omission is understandable. Since many of these introduced species belong to genera not otherwise found in New Zealand, there is little chance that they will be confused with indigenous taxa. Species such as *Oxalis corniculata* and *Picris hieracioides* were included because they were collected early in the 19th century only shortly after settlement of New Zealand began, but they are probably introductions. Others, such as *Sonchus asper*, presumably arrived with the Maori, since they were collected by the first Europeans to land in New Zealand.

In the text, the species are given ample descriptions with a full author citation, place of publication, type locality, and notes on range and habitat. Synonymy is not complete, but covers most names relevant to New Zealand material. Many regional floras serve only as guides to identification and little else, giving no hint as to the botanical problems present in the area covered. But, as pointed out in the preface to the Flora, "it is recognized that many species are inadequately known and a second, but not necessarily secondary, objective has been to indicate directions in which more investigations are needed," which objective has been admirably fulfilled. Particularly outstanding are the copious notes discussing various problematical specimens in herbaria, and field observations which will be of great help to botanists dealing with these groups in the future. One of the most valuable and novel features of the Flora is the inclusion of sections augmenting the generic treatments with comments on heteroblasty, sexual expression, polymorphy, hybridism, horticultural forms, taxa of uncertain position, taxonomic synopses, notes on special problems, synopses of growth forms, and general field observations and remarks reflecting Allan's wide knowledge of plants in the field and the literature concerning them.

A recurrent theme in the Flora is the suggestion that hybridization is responsible for the variation within many plant groups. Although both men had published on the subject separately, in 1934 Leonard Cockayne and Allan published a list of nearly 500 wild species-hybrids in the New Zealand flora. This paper must have met considerable skepticism and opposition from botanists in other areas of the world, where interspecific sterility barriers are the *sine qua non* of orthodox biosystematy. Nevertheless, Allan received support from subsequent workers in the dominion and elsewhere, and continued to maintain that hybridization is a potent force in the evolution of the New Zealand flora. It is evident from numerous well-documented exam-

ples that actual, rather than apparent, hybridization does occur and is largely responsible for the taxonomic complexity of these groups.

The Flora is illustrated with several excellent line drawings by Nancy Adams, who also designed the attractive dust jacket. To achieve a volume of handbook size, very thin paper was used; the nearly 1100 pages make a book only 2 cm. thick. The copious notes are printed in 6-point type, which seems too small to be read comfortably for very long. The printing and binding are very well done. The small size of the volume should not belie the riches it contains. ROBERT ORNDUFF, Department of Botany, Duke University, Durham, North Carolina.

NOTES AND NEWS

CHROMOSOME NUMBERS IN CROSSOSOMA. Since the relationships of the small family Crossosomataceae have been a subject of discussion, it is of interest to record the chromosome numbers of two species of the only genus. *Crossosoma californicum* Nutt. is confined to Santa Catalina, San Clemente, and Guadalupe islands off the coast of southern California and Baja California, whereas *C. bigelovii* Wats. is found about the margins of the Sonoran Desert in California, Arizona, Baja California, and Sonora. *Crossosoma parviflorum* Rob. & Fern. and *C. glaucum* Small, both described from Arizona, are probably not distinct from *C. bigelovii* at a specific level, and so the family probably consists of only two species. The chromosome number of *C. californicum* was determined from buds collected from Pebbly Beach Canyon near the

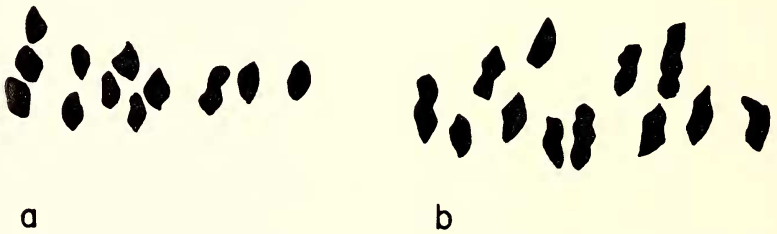


FIG. 1. Chromosomes of *Crossosoma* at meiotic metaphase I, a, *C. californicum*; b, *C. bigelovii*. Both figures $\times 2600$.

water purification plant, Santa Catalina Island, Los Angeles County, California (Taylor & Ornduff 4383, UC); from material propagated at Rancho Santa Ana Botanic Garden, taken from a collection (Wolf 1487, RSA; fig. 1a) made at the junction of Pebbly Beach and Renton Mine roads, Santa Catalina Island; and from material of undetermined origin cultivated in the East Bay Regional Parks. All of these collections had a gametic chromosome number of $n=12$, with no meiotic irregularities observed, as did a single collection of *C. bigelovii* from Morongo Valley, Riverside County, California (Davis 105, RSA; fig. 1b). The twelve pairs of relatively small chromosomes found in these plants are markedly different from the five very large pairs found in *Paeonia* (Ranunculaceae), with which *Crossosoma* has been allied. They are, however, more or less similar to the chromosomes found in a number of other families of angiosperms. PETER H. RAVEN, Division of Systematic Biology, Stanford University, California, and MARION S. CAVE, Department of Botany, University of California, Berkeley.